DATASET ON FOREIGN EXCHANGE MARKET ACTIVITY

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Abstract

The Bank of Israel monitors and analyzes activity in the foreign exchange market on an ongoing basis. The Information and Statistics Department manages a database of foreign exchange transactions divided by segment and instrument. The transaction data, which are collected on a daily basis, are processed into trading turnover, conversions, and exposures to foreign exchange. The data make it possible to monitor developments in sectors that operate in the foreign exchange market, and help the Bank of Israel make policy decisions. Some of the information and data that the Department produces for decision makers from the database are published on the Bank of Israel's website, and are available for use by economists and analysts that monitor financial activity in the economy.

This paper outlines the various indices in the database and the methodological framework of the main aggregates calculated from it. It also samples how the data are used, including international comparisons.

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1. BACKGROUND AND PURPOSE OF THE PAPER

The foreign exchange market is considered the largest and most sophisticated in the world, where the intersection between supply of and demand for foreign exchange sets the exchange rates between various currencies. Foreign exchange trading is done mainly through banks and financial entities, and is conducted continuously.

Globalization has contributed greatly to the expanded use of foreign exchange in international trade and the flow of capital between countries, which has increased the need to monitor activity in this market. The Bank of Israel monitors the foreign exchange market, analyzes events in that market, and sometimes even acts in the market as a participant. The Bank also publishes representative exchange rates of the shekel against foreign currencies.

In order to improve the Bank of Israel's capabilities to monitor and analyze developments in the Israeli foreign exchange market, the Information and Statistics Department manages an itemized database on activity in the market. The Department gathers data and information on shekel/forex transactions on a daily basis from financial intermediaries in Israel and abroad, and processes that data into a detailed database that provides a broad and high-quality view of the activity of the various segments in this market.

This paper outlines the various indices in the database and the methodological framework of the main aggregates calculated from it. It also samples how the data are used, including international comparisons.

2. DATA FRAMEWORK AND DEFINITIONS

The transactions included in the database are transactions in which the shekel is involved and which are traded over the counter (OTC).[1] The database includes a number of main indices—financial instruments, base assets, time, and sectors—that help the Bank of Israel define activity in the shekel/foreign exchange market and set its policy accordingly.

The following is a list of the main indices:

2.1 Financial instruments through which transactions are made

2.1.1 Conversions and futures transactions – Instruments that guarantee the purchase or sale of a base asset at a price agreed to in advance (ordinary transaction or differential transaction).

[1] Currency traded directly between two parties, and not through a proper currency exchange.

- Example: On the day the transaction is made, Company A undertakes to purchase 400 shekels from Company B in exchange for 100 dollars (the exchange rate is determined when the transaction is made). The monetary accounting will be done up to two days from the time the transaction is made (Spot), or within a period of more than two days after the transaction is made (Forward).

2.1.2 Swap transactions – Exchanging quantities of base assets at various times and in various directions that offset each other.[2]

- Example: On the day the transaction is made, Company A purchases 100 dollars for 400 shekels (Spot), and undertakes to purchase 400 shekels for 100 dollars following a period set out in the terms of the transaction (Forward). The exchange rate for both parts of the transaction is set on the day the transaction is made.

2.1.3 Options – The right to purchase or sell a base asset at a future time at a predetermined price.

2.2 The base assets upon which the transactions are based, and the value derived from them

Transactions obtained in the system are based on the following base assets[3]:

2.2.1 Currency – Transactions in which the shekel is involved.
2.2.2 Interest rate – Transactions in which an unindexed yield is involved.
2.2.3 Consumer Price Index

This table outlines the instruments reported in the shekel/foreign exchange market:

Base asset	Immediate conversion	Futures	Swap	Options
Foreign exchange	Spot	Currency Forward	Fx Swap / Currency Swap	Fx Options

2.3 Time

2.3.1 The time a transaction is made – One of the characteristics of the transactions obtained in the system, which enables us to break down the transactions by year, by month, and up to the level of seconds.

2 Excluding some cross-currency swap transactions.
3 This paper focuses on transactions where the base asset is currency.

2.3.2 Transaction range – Derived from the time of its execution and the date of its payment. The transactions can be broken down into ranges—short and long—thereby specifying the activity of market participants.

2.4 The main sectors active in the foreign exchange market in Israel

The activity of the various sectors in the foreign exchange market is not homogenous. The sectoral breakdown of transactions reported to the system enables policymakers to analyze the activity of each sector operating in the market, including changes in its exposures to foreign exchange, thereby better understanding everyone's motivations.

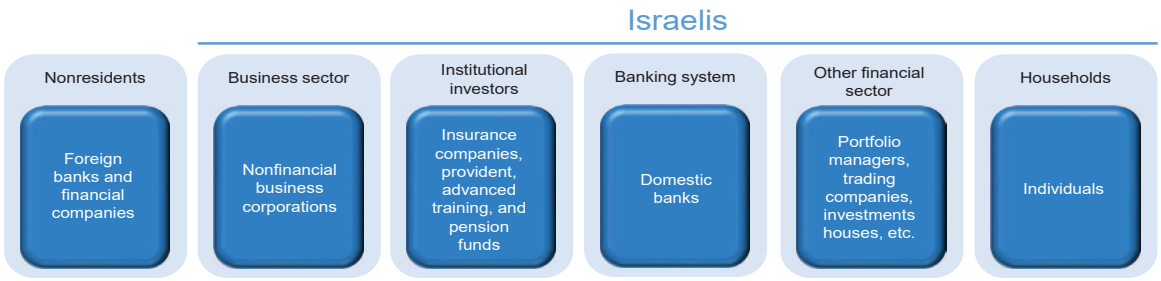
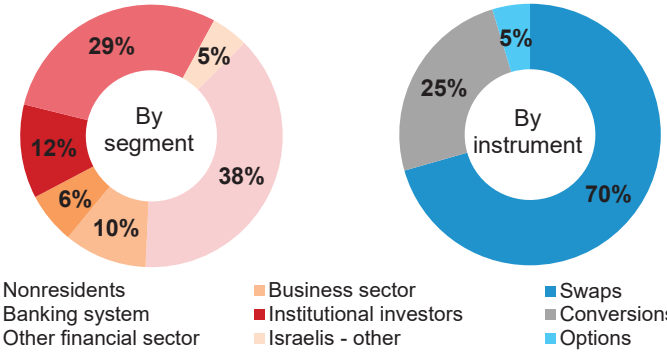


Figure 1 shows the distribution of trading volume according to the system's indices—derivatives and instruments. It shows that in 2018, nonresidents were the dominant sector in activity vis-à-vis the domestic banks (38 percent). In the breakdown according to instruments, swap transactions were the dominant instrument (70 percent).

Figure 1
Domestic Banks' Volume of Activity in the Foreign Exchange Market by Counter-Segment and By Instrument, 2018
(100%=$1,953 billion)



SOURCE: Bank of Israel.

3. SOURCES OF DATA

The domestic banking corporations have been reporting transactions to the data system since 2008. In 2017, the sources for reporting were expanded to include transactions reported by foreign reporting entities.

Currently, after adding the foreign reporting entities, the system makes it possible to obtain a comprehensive picture of activity in the foreign exchange market. Most transactions in which the shekel is involved—such as transactions between institutional investors and nonresidents, and transactions among nonresidents—are included. The reports are obtained based on Bank of Israel orders that regulate the terms of reporting.

3.1 The legal framework

In 2016, the Bank of Israel published an order under the authority of the Bank of Israel Law. This order set out a duty to report on the execution of transactions in foreign exchange derivatives, interest rate derivatives, and derivatives of indices in which the Israeli currency is involved. The order imposes a reporting requirement on various banking corporations and financial entities, both foreign and domestic, that in the past 12 months executed transactions averaging $15 million or more per day.[4] The Bank of Israel website contains a broad explanation of the Order, as well as examples of reporting on transactions and questions and answers concerning the reporting.[5]

Entities reporting to the data system		
12 domestic banking corporations	2 domestic financial institutions	About 40 foreign banks

3.2 Data sources and frequency

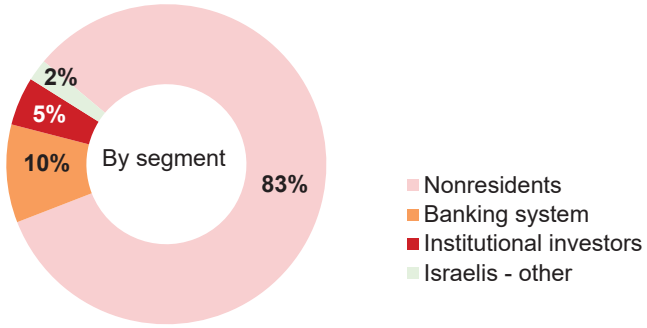
The data are reported at a daily frequency regarding all transactions executed on the previous business day. Since the reporting is received from reporting entities located in various time zones, it was determined that for uniform purposes, the reporting framework for transactions would be according to the Universal Time Continuum (UTC). As such, the daily report includes transactions made between 00:00 and 23:59 UTC on business day (T), and the required information is received on the following business day (T+1).

4 Domestic banking corporations report to the Bank of Israel regardless of the reporting benchmark.
5 https://www.boi.org.il/en/NewsAndPublications/LegislationAndRegulations/Pages/Derivatives.aspx

The addition of data from foreign reporting entities improves our understanding of activity in the shekel/foreign exchange market, as various report types can be produced showing activity from the point of view of the domestic banking corporations only, from the point of view of foreign reporting entities, or of all those reporting to the system. This division makes it possible to separately analyze the activity of domestic entities in the foreign exchange market, and to study the activity between foreign entities. We can also divide nonresidents into main segments.

Figure 2 shows trading volume by foreign reporting only. It shows that about 83 percent of the trading volume of foreign reporting entities was done vis-à-vis nonresidents.

Figure 2
Volume of Foreign Exchange Market Activity of Foreign Reporting Entities by Counter-Segment, 2018
(100%=$2,631 billion)



SOURCE: Bank of Israel.

3.3 Reporting format

The new reporting format was adapted to the international standard formulated by the ISDA[6], the leading organization for advancing the standardization of trading in OTC transactions.

The format consists of 40 reporting fields in three parameters:
a. Details of the reporting entity;
b. Details of the customer;
c. Features of the transaction—time of execution, instrument, expiration date of the contract, price of the transaction, denomination amount, and value of the transaction.

6 The ISDA created a uniform contract for derivatives transactions. For further details: https://www.isda.org

The daily reporting is on new transactions executed on the previous business day. At the end of each month, a report is received on each reporting entity's transactions that have not yet been paid up.

4. MAIN DATA AND REPORTS

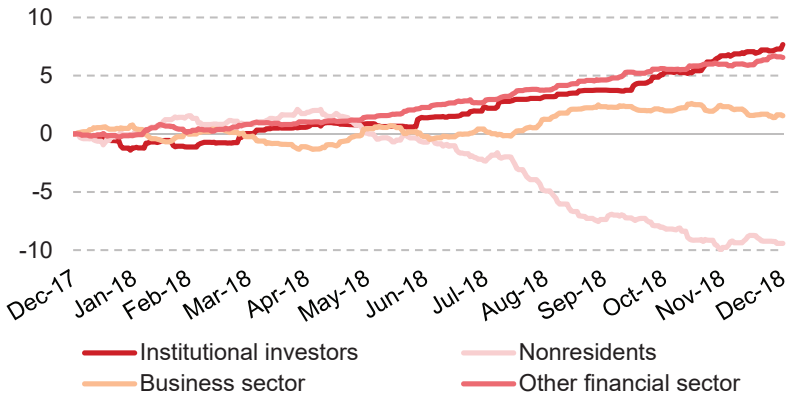
The Information and Statistics Department calculated and processes the received data in various ways to arrive at a reliable and consistent dataset. The data undergo completeness and consistency controls, logical controls, and statistical controls. The system produces reports that are used by policymakers at the Bank of Israel.

The following are the main reports:

4.1 Cumulative foreign exchange purchases by the main segments

A daily report that shows net cumulative foreign exchange purchases (purchases minus sales) of each segment, as the reporting entities report on them to the system. The report presents the segment distribution of expected foreign exchange receipts from each days' conversion and derivative transactions.
Figure 3 shows the cumulative foreign exchange purchases according to reports from the domestic banks only. It shows that over the years, nonresidents are the main sellers of foreign exchange in the Israeli market, meaning net purchasers of shekels. In contrast, the other segments are net purchasers of dollars, meaning they are sellers of shekels.

Figure 3
Estimated Cumulative Foreign Exchange Purchases by the Main Segments, 2018 ($ billion)



SOURCE: Bank of Israel.

With this report, we can estimate the change in various segments' exposure to the exchange rate. Exposure to the exchange rate (or exposure to foreign currency) is the monetary amount at risk in a case of changes to the shekel's exchange rate against foreign currencies. Regarding nonresidents, exposure to the exchange rate is measured by their surplus of shekel assets over shekel liabilities. The balance of nonresidents' exposure to the shekel makes it possible to derive their motivation for acting in the market in response to significant changes in the exchange rate.

4.2 Trading volume

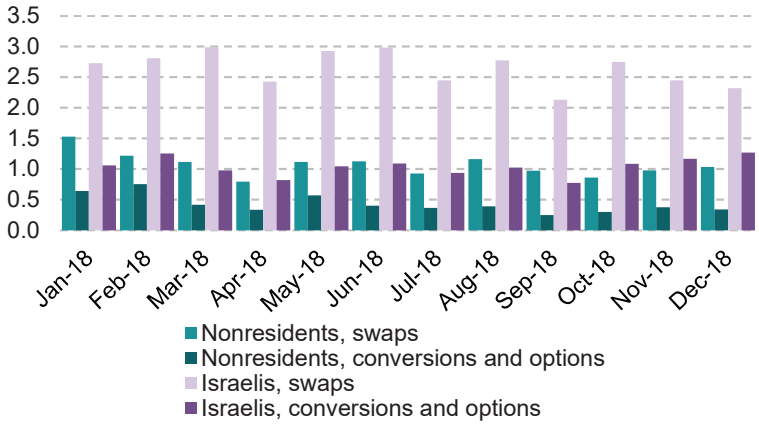
Trading volume represents the volume of activity in the shekel/foreign exchange market, and is an important tool in monitoring market behavior. The trading volume report produced from the system's data includes the gross total of transactions, meaning purchases and sales in absolute value. The volume of transactions is segmented according to the indices surveyed in Section 2—instruments, base assets, time of execution, and sectors.

In order to precisely calculate trading volume, the double counting of transactions must be avoided. Double counting may occur in two situations:

- Transactions between two entities that report to the system;
- Swap transactions—transactions that include the exchange of the same amount twice.

Figure 4 presents trading volume from the point of view of the domestic banking corporations, and shows that most of the trading volume by Israelis is in swap transactions.

Figure 4
Average Daily Trading Volume by Residence and Instrument, 2018 ($ billion)

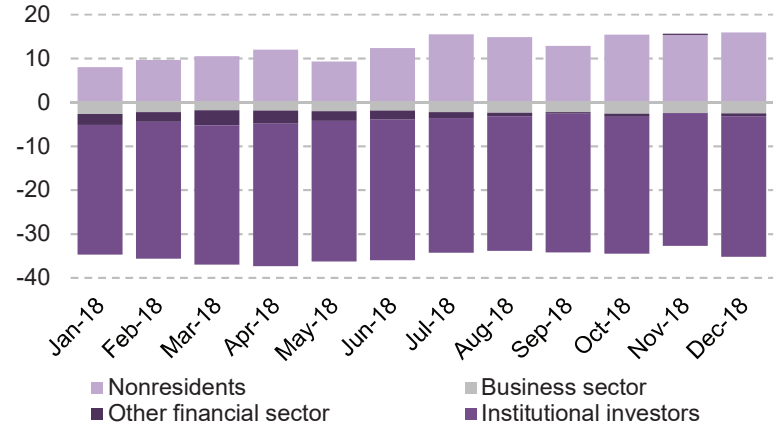


SOURCE: Bank of Israel.

4.3 Swap transactions

Figure 5 presents the capitalized amount of swap transactions that have not yet been paid up, over time by direction and segment.
The figure shows that nonresidents have a positive balance for purchasing foreign exchange in the future (sales of shekels). This balance reflects the nature of nonresidents' investment activity in Israel, mainly through the Tel Aviv Stock Exchange. In order to lower their exposure to the shekel, they undertake to sell shekels in the future at a fixed rate. In contrast, institutional investors invest abroad, and in order to reduce their exposure to foreign exchange, they undertake to sell foreign currency in the future (to buy shekels) at a fixed rate.

Figure 5
Swap Balances by Segment, 2018 ($ billion)

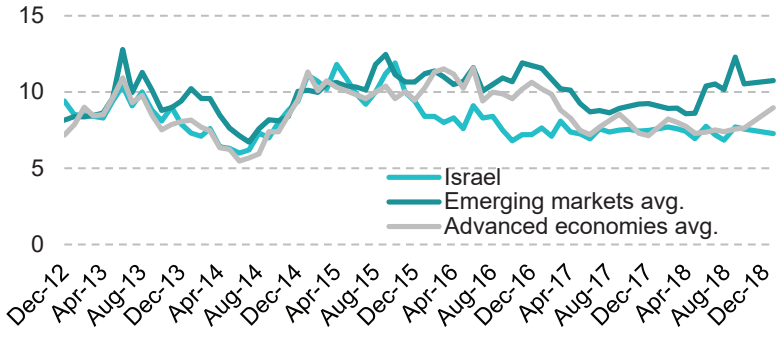


SOURCE: Bank of Israel.

4.4 Implied shekel/dollar volatility

Exchange rate risk is reflected in the volatility of the shekel/dollar exchange rate. The volatility observed in the exchange rate is measured according to the implied volatility of shekel-dollar options, which is calculated through the Black and Scholes formula.
An increase in the standard deviation reflects market expectations of higher volatility in the exchange rate, while a decline in the standard deviation reflects market expectations of stability in the exchange rate.
Figure 6 presents a comparison of the implied volatility in the shekel/dollar market and the standard deviations in developing and advanced economies against the dollar. The figure shows that in recent years, the shekel/dollar exchange rate risk has been lower than the exchange rate risk of other currencies against the dollar.

Figure 6
Implied Volatility of Foreign Exchange Options, 2014–2018
(weekly data, percent)



Emerging markets: Mexico, South Korea, Philippines, Poland, Chile, South Africa, Thailand, Hungary, Turkey, and Singapore.
Advanced economies: Australia, Canada, Japan, UK, Switzerland, and eurozone.
SOURCE: Bank of Israel.

4.5 Intraday reports

The data system also makes it possible to analyze intraday activity on the previous business day, based on the report on the time of the transaction. The intraday analysis is significant particularly on days when there are sharp changes in the exchange rate, in that it makes it possible to trace the dynamic of sectoral activity in the market during the day.
An example of an intraday report is the "heat map", which presents an analysis of the number of transactions by nonresidents. The report shows the days and hours during the week in which foreign exchange activity was more intensive, meaning larger activity volumes. The highest number of transactions are made between Monday and Friday between 3:00 and 5:00 pm Israel time (Figure 7).

Figure 7
Average Daily Number of Transactions by Reporting Entities by Day and Time, 2018

Israel time	Monday	Tuesday	Wednesday	Thursday	Friday
02:00	22	39	41	29	33
03:00	18	20	18	21	26
04:00	15	22	11	9	17
05:00	10	11	7	19	7
06:00	28	20	16	21	15
07:00	58	70	77	52	48
08:00	261	289	270	237	193
09:00	524	478	481	450	378
10:00	532	526	522	444	414
11:00	573	655	667	599	609
12:00	596	517	469	634	429
13:00	577	546	577	563	683
14:00	604	506	570	720	547
15:00	642	803	727	693	618
16:00	664	688	780	698	665
17:00	698	834	661	701	670
18:00	355	385	324	373	303
19:00	184	195	206	267	158
20:00	166	158	216	162	154
21:00	154	130	158	155	155
22:00	158	159	155	169	129
23:00	79	73	75	77	47
00:00	22	15	14	17	2
01:00	10	7	17	14	1

Number of transactions	
0-30	
30-375	
375-834	

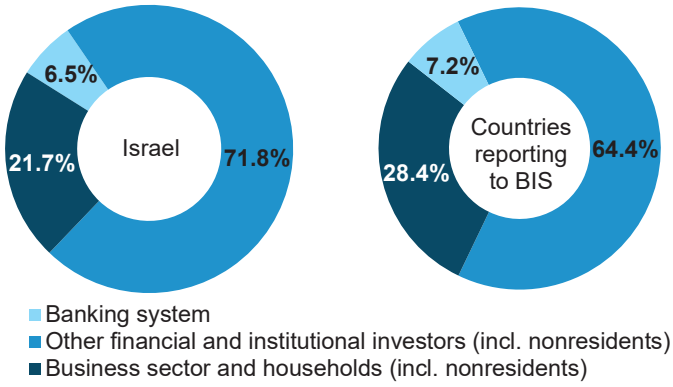
5. INTERNATIONAL COMPARISON

The following is a sample use of the system's data in an international comparison. For the purpose of the comparison, the Bank of International Settlements (BIS) database was used.[7] Similar to other central banks, the Bank of Israel Information and Statistics Department reports to the BIS on foreign exchange activity reported by the domestic banking corporations, among other things. The BIS survey includes detailed statistics on foreign exchange and derivative activity. The survey is conducted every three years, and calculated permanently regarding April.[8] The database contains OTC data on 46 countries including Israel.

It should be noted that the ability compare the domestic foreign exchange market with international markets is limited because of the differing nature of activity between countries.

Figure 8 shows the trading volume reported by the domestic banking corporations, segmented by sectors, and shows that in Israel most transactions in 2016 were conducted with financial institutions that are not domestic banking corporations—unlike in other countries, where most transactions are with domestic banks.

Figure 8
Distribution of Active Segments as a Share of Average Daily Trading Volume, April 2016

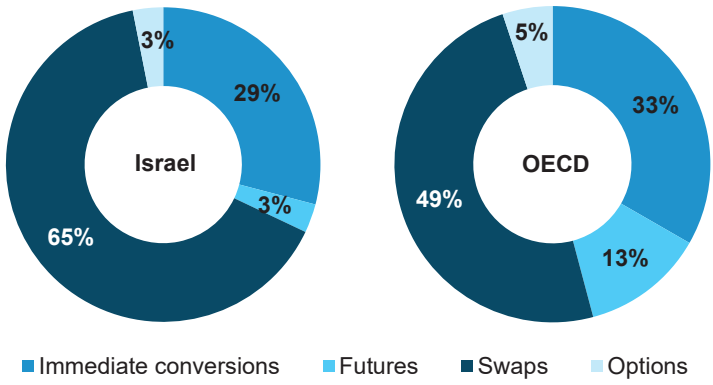


SOURCE: Bank of Israel.

A comparison of trading volume by instrument (Figure 9) shows that there are more swap transactions in Israel than in other OECD countries, on average. In contrast, futures transactions account for a smaller portion of total trading volume.

7 http://www.bis.org/statistics/totcredit.htm?m=6%7C326
8 The most recent available data are for April 2016.

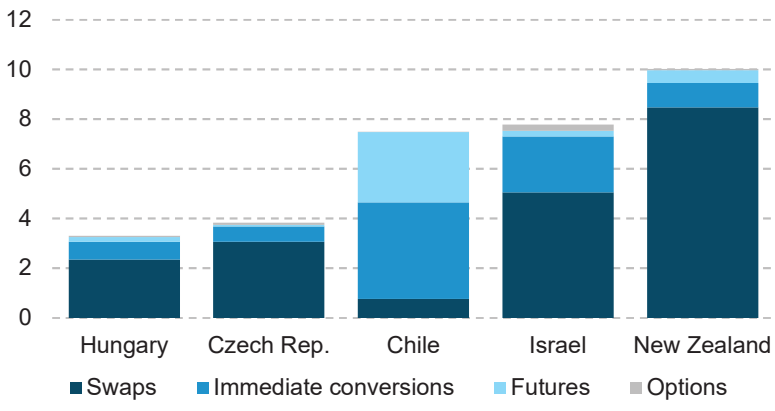
Figure 9
Distribution of Average Daily Trading Volume by Instrument, April 2016



SOURCE: Bank of Israel.

Compared with countries that have a similar average daily trading volume to that of Israel and have a domestic currency, Figure 10 shows that Israel is similar to Hungary, the Czech Republic, and New Zealand, in that most foreign exchange transactions are through FX swaps.

Figure 10
Distribution of Trading Volume by Instrument, International Comparison, April 2016 ($ billion)



SOURCE: Bank of Israel.